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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,152	03/19/2004	Kiril A. Pandelisev	3027-0032	6403
39083 7590 12/12/2007 CERMAK KENEALY & VAIDYA, LLP 515 EAST BRADDOCK RD SUITE B Alexandria, VA 22314			EXAMINER NGUYEN, THUKHANH T	
			ART UNIT 1791	PAPER NUMBER
			MAIL DATE 12/12/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/804,152

Applicant(s)

PANDELISEV, KIRIL A.

Examiner

Thu Khanh T. Nguyen

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 389-408 and 410-421 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 389-408, 410-421 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 389-405, 410, and 414-420 are rejected under 35 U.S.C. 102(b) as being anticipated by Greskovich (4,040,848).

In regard to claims 389, 393, 399 and 410, Greskovich teaches polycrystalline silicon wafer boats (col. 8, lines 67-68; col. 9, lines 1-6), impervious crucible, a thin walled tube, a long rod, a spherical body, or a hollow shaped article (col. 7, lines 61-65) and method of making thereof, wherein the wafer boat comprising particles of pure silicon (col. 2, lines 29-30), or silicon-boron compound in which boron is in the range of 0.1%-5% by weight (col. 3, lines 61-65) for forming a polycrystalline sintered silicon body (col. 6, lines 65-68) at the temperature of 1200°C-1390°C (col. 4, lines 2-15) and at the pressure of 500 psi to 30,000psi (col. 10, lines 37-40).

In regard to claims 390, 394, 400, 405, wherein the silicon boats could be formed by extrusion, injection molding, die-pressing, pressing, or casing (col. 5, lines 45-51), in which the material is heated to a certain temperature, sintered (col. 6, lines 1-54) and inherently cooled down to room temperature for storage or to operating temperature of the wafers.

In regard to claims 391, 395-396, 401, 414-417, wherein the boat fabrication material are silicon powder or silicon-boron compound as described above.

In regard to claims 392, 404, wherein the process includes a purging or purifying step (col. 3, lines 29-34), such vaporization or leaching (col. 5, lines 51-56) prior to sintering.

In regard to claims 397-398, 402-403, 418, wherein the sintering of the silicon boat is carried out in an inert atmosphere that has no significant deteriorating effect on its property (or neutral inert gas) such as argon, helium or a vacuum (col. 6, lines 44-54).

In regard to claims 419-420, wherein the silicon material can be a slurry or a solid stage sintering depending on the sintering temperature (col. 4, lines 7-22).

3. Claims 389, 391, 393, 399, 405 are rejected under 35 U.S.C. 102(b) as being anticipated by Zehavi et al (6,284,997).

Zehavi teaches a wafer tower (10) or wafer carrier, wafer boat made of silicon of semiconductor grade, that is be of very high purity or of virgin polysilicon by vapor deposition (col. 1, lines 33-39 & lines 44-47; col. 2, lines 39-45).

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 406-408 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greskovich et al (4,040,848) or Zehavi et al (6,284,997) as applied to claims 389-405, 410, and 414-420 above, and further in view of Dietze et al (4,203,940).

Greskovich et al or Zehavi et al disclose polycrystalline silicon tubes and boats as described above, but fail to disclose the steps of cutting the boat along medial line, forming openings in the cylindrical walls, and forming ribs extension and slots.

Dietze et al discloses crystal wafer rack structures, or wafer boats, and the method forming thereof. In which the method comprises the steps of forming a silicon tube (col. 4, lines 57-59), next, the tube is machined, or cut, on a narrow transverse portion of a side surface of the tube in the direction perpendicular to a longitudinal axis of the tube for forming the ribs and grooves/openings (col. 6, lines 3-19); then the tube is cut in a direction parallel to the longitudinal axis (col. 5, lines 2-11) to form two spaced apart wall portions having free edges extending parallel to the longitudinal axis of the tube and join to one another by a bridging portion located at the end of the tube (3, 7).

It would have been obvious to one of ordinary skill in the art at the time the applicant's invention was made to modify Greskovich et al or Zehavi et al by providing additional machining steps after forming the wafer tube by cutting a plurality of ribs and slots on the wall of the tube as taught by Dietze et al in order to form supporting slots for the carrying wafers.

6. Claims 411-413 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greskovich et al (4,040,848) as applied to claims 389-405, 410, and 414-420 above, and further in view of Boyd et al (6,835,633).

Greskovich et al disclose a wafer boat and a process for manufacturing wafer boat as described above, but fails to disclose that the wafer boat is made of silicon germanium.

Boyd et al disclose that the wafer carrier could be of any Si-containing material, such as Si, SiGe, SiGeC, Si/Si, Si/SiC or Si/SiGeC and using any conventional techniques (col. 4, lines 50-61).

It would have been obvious to one of ordinary skill in the art at the time the applicant's invention was made to modify Greskovich by providing any combination of Si, SiGe, SiGeC, Si/Si, Si/SiC or Si/SiGeC for making wafer carriers/boats as taught by Boyd et al, because all these material have been proved to be suitable alternative material for forming wafer boat.

7. Claim 421 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greskovich et al (4,040,848) as applied to claims 389-405, 410, and 414-420 above, and further in view of Loxley et al (6,355,587).

Greskovich et al discloses that the forming of wafer boat is carried out at a high temperature in an inert atmosphere or in a vacuum as described above, but fails to disclose that the silicon material is plasma heated.

Loxley et al discloses a method for forming products from porous silica preform, comprising the step of heating material by using plasma arc for fast heating wafer material (col. 18, lines 34-36).

It would have been obvious to one of ordinary skill in the art at the time the applicant's invention was made to modify Greskovich by providing plasma heating step as taught Loxley in order to expedite the heating/sintering process of the material during the forming of silicon wafer boats.

8. Applicant's arguments with respect to claims 389-408, 410-421 have been considered but are moot in view of the new ground(s) of rejection.

During the interview, the applicant had emphasized the important of having wafer boats made exclusively or majority of silicon, which was not disclosed by the previous presented prior art.

The newly amended/added claims are now rejected under Greskovich ('848), Zehavi ('997), Dietze (940) and Loxley ('587), wherein each reference or the combination thereof have recognized the use of silicon (or silicon of semiconductor grade – Zehavi) is superior over silicon carbide or silicon nitride since it has higher level of purity, and are more suitable to make wafer boats for using with silicon wafers.

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thu Khanh T. Nguyen whose telephone number is 571-272-1136. The examiner can normally be reached on Monday- Friday, 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gupta Yogendra can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TN

  
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